Claims

~~Patent claims~~

1. A method for determining the amplitude and phase angle of a measuring signal corresponding to a current or a voltage on an electrical power supply network by using sampled values of the measuring signal, a model of the measuring signal containing at least a sinusoidal component being used to calculate the model amplitude and phase parameters of the measuring signal with the sampled values by applying a recursive least-squares estimation method, characterized in that
   - use is made of a model of the measuring signal containing the sinusoidal component in accordance with the relationship $y = A \cdot \sin(2\pi ft + \varphi)$, y designating an instantaneous value of the model of the measuring signal, A the amplitude, f the frequency, φ the phase angle and t the time, and
   - by using this model of the measuring signal and by using the sampled values, by means of a recursive nonlinear least-squares estimation method, the model frequency parameter (f) of the measuring signal is also determined by the estimation together with the model amplitude parameter (A) and the model phase angle parameter (φ).

2. ~~The method as claimed in claim 1, characterized in~~ that use is made of a model for the measuring signal in accordance with the relationship $y = A \cdot \sin(2\pi ft + \varphi) + d$, d modeling the DC component of the measuring signal.

3. The method as claimed in claim 1, characterized in that use is made of a model for the measuring signal in accordance with the relationship

$y = A \cdot \sin\left(2\pi \sum_{i=0}^{n} (f^{(i)} t^i) t + \varphi\right)$, $f^{(i)}$ designating the ith order time derivative of the frequency and modeling a change in the frequency over time, and various orders of the time derivative of the frequency being taken into account by selecting the variable n.

4. The method as claimed in claim 2, characterized in that use is made of a model of the measuring signal in accordance with the relationship $y = A \cdot \sin\left(2\pi \sum_{i=0}^{n} (f^{(i)} t^i) t + \varphi\right) + d$, $f^{(i)}$ designating the ith time derivative of the frequency and modeling a change in the frequency over time, and various orders of the time derivative of the frequency being taken into account by selecting the variable n.

5. The method as claimed in one of claims 1 to 4, characterized in that the values of the amplitude (A), the phase angle (φ) and the frequency (f) determined by the estimation method are output as resulting values only when the estimation error is less than a smallest permitted estimation error.